

# Effect of Education Based on Health Belief Model on the Behavior of Breast Cancer Screening in Women

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## ABSTRACT

**Objective:** The purpose of this study was to determine the effect of education based on health belief model (HBM) on the behavior of breast cancer screening (bCS) in women.

**Methods:** This quasi-experimental study was conducted on 226 women who were selected with cluster sampling method from those referred to Dezful health centers. Data collection tool was a researcher-made questionnaire. Demographic questionnaire bCS- scale, and the Knowledge about questionnaire, all given before and 3 months after the intervention. **Results:** According to the findings of the study, there was a significant relationship

between women's performance and variables of knowledge, perceived sensitivity, perceived benefits, perceived barriers, self-efficacy, and cues to action. **Conclusions:** Poor knowledge of women indicates a crucial need for formal educational programs to sensitize women regarding the importance of bCS. These educational programs should consider factors affecting bCS behaviors.

**Key words:** Breast cancer, breast self-examination, cancer screening, mammography

## Introduction

Breast cancer is one of the most common cancers among women in both developed and developing countries.<sup>[1]</sup> It is the most common cancer in women aged 40–60 years

and the second most common cancer in women aged 30–40 years, and it is also the second leading cause of cancer death in women (about 571 000 deaths) in the world.<sup>[2,3]</sup>

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According to the American Cancer Society in 2016, about 246,660 new cases of breast cancer have been diagnosed among women in the United States and 40,450 people will die because of this disease by the end of 2016.<sup>[4]</sup> Domestic statistics also show that the incidence of breast cancer in Iran has doubled during past 30 years and it has in the top ten common cancers in women, and the age of developing cancer is 10 years earlier than that of advanced countries.<sup>[5]</sup> The prevalence of breast cancer in Iran is partly low, the number of patients with recently diagnosed breast cancer is rising<sup>[6]</sup> so that the age-standardized incidence has been reported 23.65/100,000 people.<sup>[7]</sup> In Khuzestan province too, among cancers in women, it ranks first with an average age of 23.36, and the number of incidence of cancer in the female population is 2529 with a prevalence rate of 31% according to the latest census data reported by cancer statistics center. Therefore, breast cancer is a major concern in the world and Iran.<sup>[8]</sup>

Given the importance of the issue, the Office of Disease Prevention and Health Promotion in the United States in setting, its goals for healthy people by the year 2020 has considered goals such as reducing the rate of breast cancer deaths in women, reducing the cancer phases, increasing women's susceptibility, and participation in breast cancer screening (bCS).<sup>[9]</sup> It is known that the key to reducing deaths due to this cancer is early diagnosis of the disease,<sup>[10]</sup> and in case of early diagnosis in initial stages and timely treatment, the chance of recovery is increased leading to a lifetime of more than 90% of patients with cancer;<sup>[11]</sup> therefore, participation of women in diagnostic and screening programs is of great importance. Early detection approaches include awareness of early signs and symptoms of the disease, monthly breast self-examination (BSE), a clinical breast examination (CBE), and mammography.<sup>[12-16]</sup> These screening methods play a significant role in diagnosis and reducing deaths from cancer so that monthly BSE as an efficient and inexpensive method<sup>[17]</sup> can decrease cancer-related deaths by 50%.<sup>[18,19]</sup> In CBE method, about 60% of cancer incidents can also be diagnosed. Recent studies have shown that physical examination has a susceptibility of 54% and a specificity of 96%.<sup>[20]</sup> Mammography detects breast tumors 1–3 years before a mass is felt by the patient and it can detect small, untouchable lesions in women 35 years of age and over.<sup>[21]</sup> Early diagnosis is made by the participation of women themselves. The level of women's participation is achieved under the impact of various factors such as social factors, lack of examination training, different cultural barriers and sensitivities,<sup>[22,23]</sup> economic difficulties, lack of examination training, lack of awareness,<sup>[24,25]</sup> mental disorders,<sup>[26]</sup> the fear of breast cancer diagnosis, and negative attitude toward findings.<sup>[27]</sup> In Iran too, due to different

factors affecting bCS behavior and also due to lack of a written and regular program for training this method to women, this behavior is not accomplished well.<sup>[28]</sup> Therefore, paying attention to this issue for promotion and intervention of breast cancer control practices through putting behavior changing practices into action is necessary.<sup>[29]</sup> It is worth mentioning that the worthiness of these programs depends on the effectiveness of the programs and the effectiveness of training programs highly depends on the proper use of the theories.<sup>[30]</sup>

One of the models that can be effective in studying cancer preventive behaviors is the Health Belief Model (HBM).<sup>[31]</sup> HBM which was created for health training specialists in 1950s by Hochbam and Roznastak<sup>[32]</sup> includes aspects such as perceived susceptibility toward the disease, perceived seriousness, perceived barriers, perceived benefits, self-efficacy, and cues to action. According to this model, people must believe that even in the absence of any symptom, the disease may exist. When people find themselves at risk of the disease (perceived susceptibility) and realize that the disease has serious potential consequences (perceived seriousness) and believe that prevention would have positive results (perceived benefits) and barriers of that behavior is fewer than obtained benefits (perceived barriers) and believe that they have the ability to perform health behavior activities (self-efficacy), it would be more probable for them to accomplish this behavior.<sup>[33,34]</sup> In researches performed in Iran and the world, the perceived barrier constructs had the most prediction power, and there are conflicting findings of other constructs.<sup>[35,36]</sup> This indicates that further investigation is necessary.

With regard to the growing trend of cancer in Iran and the importance of early diagnosis of breast cancer, the researchers decided to perform a study with the aim of evaluating the effect of education based on HBM and bCS behavior in women referred to health center in Dezful using HBM, in the hope that the results of the study to be a step toward health promotion of the society and promotion of cancer screening behaviors.

## Methods

### Study design, setting, and participants

It was an experimental pretest–posttest study that took place for 3 months from November 2014 to January 2015. Research population included Dezful women 20–60 years old. Regarding sample volume formula, the total number of samples considering 20% downfall in participants was estimated 226 people, who were selected in random cluster from 15 health centers in Dezful. The inclusion criteria were as follows aged 20–60 years, having family file in the selected health centers, not having breast cancer or other cancers,

Persian literate, not breastfeeding or being pregnant, and willingness to participate in the study [Figure 1].

### Data collection tools

Data collection tool consists of a questionnaire with four sections. Section one includes semi-structured with open-ended questions related to demographic factors (16 questions related to age, occupation, etc.), section two had questions related to measuring the level of awareness (19 questions), section three included questions designed based on HBM constructs (35 questions), and section four included questions related to performing each bCS method (3 questions). In scoring questionnaire's items, in awareness section, correct answers were given 1 point and wrong answers were given null point (total score range between a minimum of zero and a maximum of 19). Section three of the questionnaire included questions related to HBM constructs including perceived benefits (8 items), perceived susceptibility (6 items), perceived barriers (8 items), perceived severity (4 items), self-efficacy (4 items), and cues to action (5 items) and were scored in 5-point Likert scale, from 1 to 5 (strongly agree 5; agree 4, undecided 3, disagree 2, and strongly disagree 1).

Data were collected through a questionnaire made by the researcher, and content validity was used. For this

purpose, the questionnaire was evaluated by professors of Ahvaz Jundishapur University of Medical Sciences, and their corrective comments were applied, the validity and reliability of which had been determined previously by the main investigators as part of their studies toward master of health promotion science. Items with content validity ratio of  $>0.62$  and content validity indices  $>0.79$  were accepted. Cronbach's alpha for reliability was obtained as 0.76. The questionnaire stability using Cronbach's alpha was calculated as perceived susceptibility (0.90), perceived severity (0.82), perceived benefits (0.85), perceived barriers (0.97), perceived self-efficacy (0.82), and cues to action (0.94).

### Educational intervention

Participants in the intervention group received the breast cancer educational program. The educational intervention consisted of four teaching sessions and each session lasting 90–120 min. The content of educational programs included basic information regarding breast cancer facts and figures, breast cancer epidemiology, risk factors of breast cancer development, signs and symptoms, important early detection, recommended screening methods, guidelines for mammography screening, role of mammography in early diagnosis breast cancer, and presentation list of

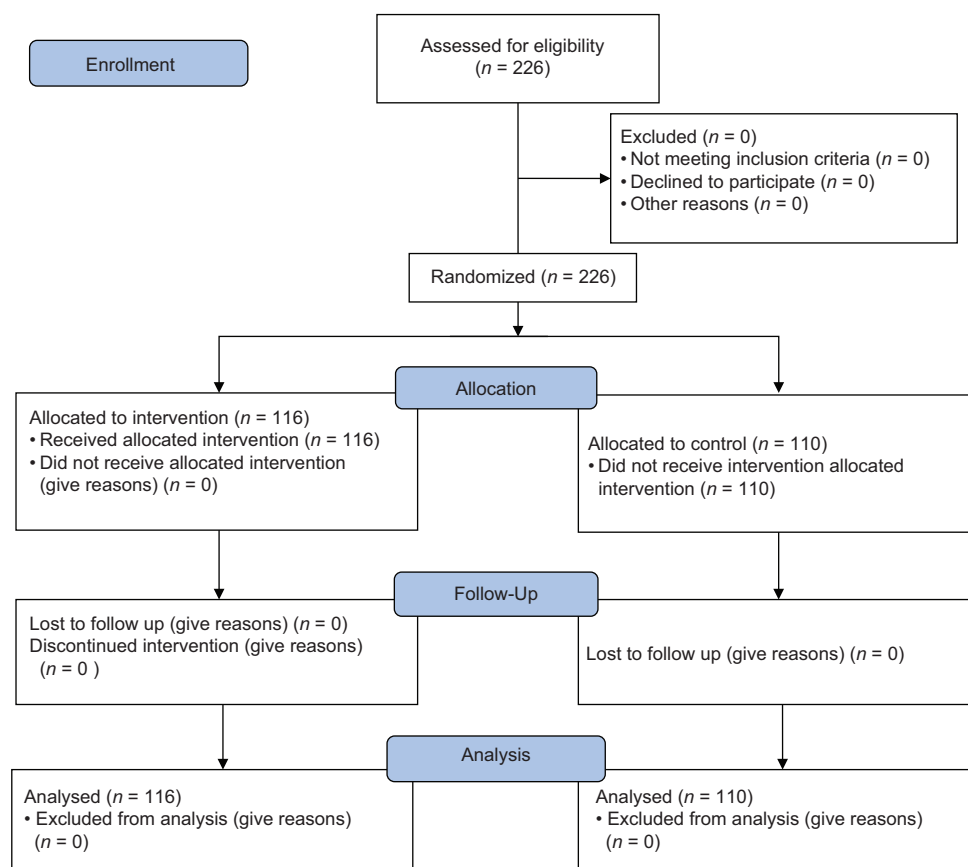


Figure 1: CONSORT 2010 flow diagram

governmental hospital where can get mammography. Each group received specific teaching related to health motivation, susceptibility to breast cancer, the perceived benefits and barriers of bCS, and perceived self-efficacy based on HBM. During educational sessions, teaching methods such as PowerPoint presentation, Presentation of educational videos, group discussion, Performing breast examination on the models, asking and answering, and two pamphlets entitled “Know more about breast cancer” and early detection of breast cancer” were used. Finally, participants practiced breast examination with breast models. Three months after the educational intervention, posttest was implemented in both of the intervention and control group.

### Statistical analysis

The obtained data were analyzed by SPSS version 11.0 (IBM, USA). Descriptive analyses (means, standard deviations, and percentages) were utilized to summarize the participant's variables and present the characteristics of the participants. Chi-square, independent *t*-test, and paired *t*-test were used in the data analysis. In all of the tests, the level of significant was considered as  $\alpha < 0.05$ .

### Ethical considerations

This study was approved by the Ethics Committee affiliated to Ahvaz Jundishapur University of Medical Sciences (Ethics Code: Ajums.rec.1393.366). In this study, researchers were committed to ethical issues of obtaining informed consent from participants, respect for voluntary participation and inform the participants of the purpose of the study.

## Results

Mean age of people under study was  $39.75 \pm 9.05$  years ranging from 20 to 59 years. The majority of people participated in this study had diploma (43%), were housekeeper (76%), and married (84%). Other descriptive indicators of variables under study are presented in Table 1.

However, scores of the two items including the rate of in the intervention group increased from 29% to 79% 3 months after the intervention ( $P < 0.001$ ) and mammography in the intervention group increased from 15% to 63% 3 months after the intervention ( $P < 0.001$ ). However, there were no significant differences between two groups after intervention in scores of CBE [Table 2].

The results of comparing the mean scores of knowledge and HBM subscales before and after educational intervention within and between intervention and control groups are described by Independent *t*-test showed that before intervention, the mean scores of knowledge and health beliefs in the two groups were similar in almost all subscales

Table 1: Baseline characteristics of study subjects, *n* (%)

Group variable	Group control <i>n</i> = 110	Group intervention <i>n</i> = 116	<i>P</i>	Statistic
Job				
Employees	7 (6)	12 (11)	0.628	3.119*
Free	5 (4)	3 (3)		
Housekeeper	91 (83)	83 (72)		
Retired	4 (4)	6 (5)		
Working	1 (1)	2 (1)		
Unemployed	8 (7)	10 (9)		
Educational level				
Low literate	35 (32)	49 (42)	0.199	4.656*
Highschool diploma	52 (47)	76 (66)		
Bachelor	17 (16)	19 (16)		
Bachelor's degree and higher	6 (6)	2 (2)		
Marital status				
Single	14 (13)	13 (11)	0.734	1.278*
Married	92 (84)	99 (85)		
Divorced	4 (4)	4 (4)		
Widowed	97 (88)	104 (90)		
Age (yr)	39.75 ± 9.05	39.44 ± 9.74	0.437	0.248**
Age at first menstruation (yr)	13.25 ± 1.28	13.1 ± 1.6	0.234	0.822**

Data marked with presented as mean (SD), all others are presented as frequency (%). SD: Standard deviation. \*Chi-square; \*\*t-test

Table 2: Comparison of frequency change of breast cancer screening behavior between two groups *n* (%)

Group variable		Group control ( <i>n</i> = 110)		Group intervention ( <i>n</i> = 116)		<i>P</i>
		Do not Have	Have done	Do not Have	Have done	
Breast self-examination	Before intervention	82 (75)	28 (25)	82 (71)	34 (29)	0.420
	3 months after intervention	77 (70)	33 (30)	24 (21)	92 (79)	$P < 0.001^*$
clinical breast examination	Before intervention	93 (85)	17 (15)	103 (89)	13 (11)	0.99
	3 months after intervention	90 (82)	20 (18)	96 (82)	20 (18)	0.66
Mammography	Before intervention	88 (80)	22 (20)	98 (84)	18 (16)	0.42
	3 months after intervention	85 (77)	25 (22)	38 (33)	78 (67)	$P < 0.001^*$

\*T-test

3 months after educational intervention, the mean scores of knowledge, perceived susceptibility, perceived severity, cause action, perceived benefits, perceived barriers, and perceived self-efficacy were significantly higher in the intervention group. Furthermore, the mean scores of perceived barriers decreased in the intervention group [Table 3].

## Discussion

Our study results indicated a significant increase after educational intervention in knowledge, perceived severity, perceived benefits, perceived barriers, perceived



**Table 3: Comparison of changes in mean scores of health belief model constructs after educational intervention between two groups**

Construct	Group	Score before intervention	Score after intervention	<i>P</i> <sup>a</sup>
		(mean±SD)	(mean±SD)	
Awareness	Intervention	5±2	10±4	<i>P</i> <0.001*
	Control	5±3	5±5.2	
Perceived susceptibility	Intervention	22.29±2.49	25.06±2.99	0.004*
	Control	22.81±2.87	23.56±3.73	
Perceived seriousness	Intervention	11±2.08	15±2	<i>P</i> <0.001*
	Control	12.12±2.09	12.08±1	
Perceived benefits	Intervention	31.12±3.89	34.5±4.1	<i>P</i> <0.001*
	Control	29.78±4.35	29.57±4.73	
Perceived barriers	Intervention	23±7	32.07±6.39	<i>P</i> <0.001*
	Control	25±7	28.04±6	
Self-efficacy	Intervention	22.15±5	31±4	<i>P</i> <0.001*
	Control	22±5	23±5.08	
Cause action	Intervention	94.3±26.21	66.23±24.2	<i>P</i> <0.001*
	Control	97.3±17.21	63.21±23.3	

\*t-test

severity, and cues to action after educational intervention. However, in this study, the women's performance regarding bCS (BSE) and mammography has been higher after educational intervention. This difference in mean scores of knowledge between two groups can likely be attributed to using an efficient, flexible, variety, and interesting method educational intervention in the current study.

In this study, educational program is performed based on the HBM. This model is one of the behavioral science theories that is used to investigate health-related issues. It is also used widely for describing breast cancer control behavior.<sup>[37]</sup> In this study, awareness score was significantly increased after training intervention. Another study's findings showed that awareness was significantly higher in intervention group.<sup>[29,38,39]</sup> These results are consistent with the findings of the present study.

Gozum and Capik *et al.*,<sup>[40]</sup> and Najar Kolai *et al.*<sup>[31]</sup> in a study on the effect of education on bCS behaviors stated that HBM has increased women's perceived susceptibility, which is in agreement with the current study.

Najar Kolai *et al.*<sup>[31]</sup> and Moodi *et al.*<sup>[29]</sup> showed in their study that perceived severity is very effective in adopting bCS behavior, which is in agreement with findings of the current study.

Hatefnia *et al.*<sup>[41]</sup> and Eskandari-Torbagha *et al.*<sup>[42]</sup> in their study to determine the effect of bCS training on health awareness and beliefs of women over 40 showed that women's perceived benefits in the context of bCS behavior showed a significant difference in the experimental group after intervention compared to the control group that is in line with current research.

The studies of Eskandari-Torbagha *et al.*,<sup>[42]</sup> Gozum and Capik,<sup>[40]</sup> and Farma *et al.*<sup>[37]</sup> with the aim of evaluating the effect of training on the basis of HBMon bCS behavior in women showed that after intervention based on the perceived barriers model, the test group has significantly increased compared to before training (*P* < 0.001), and the results of this study are consistent with our findings.

Hence, in the studies mentioned earlier, appropriate training intervention is done with regard to identification of appropriate behavioral factors on the basis of HBM as well as appropriate designing, which justifies the necessity of acquiring awareness for changing the behavior, and training had an important role in HBM framework in reducing perceived barriers on adopting bCS behaviors.

Hasani *et al.*<sup>[43]</sup> in their study aimed to determine the predictive level of HBM construct in adopting BSE showed that there are statistically significant differences in the breast self-efficacy construct between the group who practice BSE and the group who do not practice this behavior (*P* < 0.001) and it was also the most powerful predictor of BSE behavior in people; these results are consistent with the findings of the present study.

Tuzcu and Bahar in a study aimed to evaluate the effect of training on behaviors using the HBM showed that the average self-efficacy score 3 months after the intervention compared with before the intervention and compared to control groups are increased (*P* < 0.001); these results are consistent with findings of the present study. The present study showed that internal cue to action encourages one to do bCSbehavior and forces her to feel responsible against her health.<sup>[44]</sup>

Ceber *et al.* in their study to determine the effect of training on knowledge and behaviors using the HBM showed that the average score of internal cause action 1 year after the intervention compared with before the intervention and compared to control groups increased,<sup>[45]</sup> these results are consistent with the findings of the present study.

Bakhtari Aghdam *et al.* in their study to determine the effect of training promotion and creating bCS behaviors using the HBM showed that the average score of internal cause action did not statistically show a significant difference compared to before the study (*P* = 0.072), which is not consistent with the current study.<sup>[34]</sup> The differences is probably due to the type and the way of training people under study because, in the current study, the training was undertaken using modeling in addition to providing educational videos and lectures, as well as SMS and phone reminder follow-up which was probably the reason for this difference.

In addition, the recommendations of health care team as well as television programs can be crucial in decreasing

breast cancer and increased bCS as the most important external cue to action, and it is necessary to pay attention to these factors at developing training programs on changing behavior.

## Conclusion

It seems that health education program designed based on HBM is effective in the development of bCS behavior; also based on the findings of this study, it can be concluded that bCS behaviors require a positive attitude towards it. Therefore, we suggest that the educational programs are designed and implemented with emphasis on changing attitude toward to promote women's health.

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## Conflicts of interest

There are no conflicts of interest.

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